A *Correct* Tide-Table, *shewing the true Times of the* High-Waters at London-Bridge, *to every day in the Year* 1683. *By Mr.* Flamstead.

Each month column below is divided into H. (hours) and M. (minutes). Each day has two entries: M (Morning, upper) and A (Afternoon, lower). ☉ marks Sunday.

Day	Januar.	Februa.	March	April	May	June	July	August	Septem	Octob	Novem	Decem.
1 M	0 08	1 52	0 34	2 13 ☉	2 38	3 35	3 45 ☉	4 19	4 59	5 25	7 02	7 37
1 A	0 43	2 19	1 07	2 35	2 58	3 52	4 00	4 34	5 18	5 48	7 34	8 04
2 M	1 16	2 43	1 37	2 55	3 17	4 09	4 15	4 49	5 38 ☉	6 18	8 08	8 36
2 A	1 46	3 05	2 03	3 14	3 35	4 25	4 33	5 05	6 01	6 43	8 43	9 10
3 M	2 14	3 24	2 27	3 22	3 53	4 42 ☉	4 46	5 22	6 26	7 15	9 18	9 43
3 A	2 39	3 42	2 49	3 50	4 11	5 00	5 02	5 41	6 55	7 48	9 53	10 17
4 M	3 01	4 00 ☉	3 09 ☉	4 08 ☉	4 29	5 19	5 19	6 01	7 23	8 25 ☉	10 26	10 50
4 A	3 22	4 18	3 28	4 25	4 47	5 39	5 38	6 23	7 57	9 01	11 01	11 24
5 M	3 42	4 36	3 44	4 44	5 08	6 00	5 57	6 48 ☉	8 34	9 32	11 35	11 57
5 A	4 01	4 55	4 02	5 05	5 29	6 22	6 17	7 15	9 12	10 17		
6 M	4 19	5 16	4 20	5 27	5 51 ☉	6 45	6 39	7 43	9 50	10 54	0 07	0 29
6 A	4 39	5 39	4 38	5 49	6 15	7 08	7 03	8 14	10 29	11 31	0 38	1 00
7 M	4 59 ☉	6 02	4 57	6 15	6 40	7 33	7 28	8 50	11 09		1 08	1 28
7 A	5 20	6 27	5 18	6 42	7 06	7 59	7 55	9 26	11 46 ☉	0 06	1 36	1 55
8 M	5 41	6 54	5 41	7 11 ☉	7 33	8 25	8 23 ☉	10 02		0 36	2 02	2 20
8 A	6 05	7 22	6 07	7 40	7 59	8 52	8 53	10 38	0 22	1 08	2 26	2 42
9 M	6 30	7 54	6 33	8 10	8 27	9 19	9 24	11 18	0 55 ☉	1 36	2 47	3 04
9 A	6 58	8 26	7 03	8 42	8 56	9 50	9 58	11 57	1 26	2 02	3 08	3 22
10 M	7 27	8 59	7 32	9 13	9 24	10 20	10 31		1 53	2 26	3 25	3 40
10 A	7 56	9 32	8 04	9 43	9 52	10 50 ☉	11 07	0 33	2 19	2 48	3 48	3 58
11 M	8 27	10 06	8 36 ☉	10 13	10 21	11 20	11 43	1 07	2 41	3 07	4 04	4 15
11 A	8 59	10 39 ☉	9 10	10 42	10 49	11 50		1 38	3 01	3 25	4 25	4 33
12 M	9 31	11 13	9 42	11 10	11 16		0 19		3 20	3 44	4 44	4 50
12 A	10 04	11 43	10 14	11 38	11 44	0 20	0 51	2 31	3 39	4 02	5 02	5 08
13 M	10 37		10 45			0 51	1 23	2 52	3 56	5 24	5 20	5 28
13 A	11 11	0 13	11 15	0 05	0 12	1 20	1 56	3 12	4 14	4 46	4 40	5 46
14 M	11 43 ☉	0 40	11 44	0 30	0 38	1 46	2 19	3 32	4 33	6 10 ☉	5 01	6 07
14 A		1 05		0 55	1 05	2 12	2 44	3 50	4 52	6 35	5 25	6 28
15 M	0 14	1 29	0 13	1 17	1 29	2 37	3 04	4 08	5 13	5 48	7 01	6 52
15 A	0 43	1 51	0 39	1 39	1 52	3 00	3 25	4 26	5 36	6 15	7 27	7 14

M Stands for Morning. *A* Afternoon. ☉ for Sunday.

	Januar		Februa		March		April		May		June		July		Augult		Septem		Octobe		Novem		Decem	
	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.
M 16.	1	10	2	12	1	03	2	00	2	14	3	20	3	44	4	46	6	02⊙	6	42	7	54	7	38⊙
A	1	35	2	31	1	26	2	20	2	35	3	39	4	04	5	04	6	30	7	12	8	22	8	04
M 17.	1	58	2	47	1	47	2	39	2	56	3	59⊙	4	22	5	26	7	00	7	42	8	49	8	30
A	2	19	3	03	2	07	2	56	3	15	4	18	4	40	5	49	7	31	8	13	9	17	8	56
M 18.	2	39	3	18⊙	2	26⊙	3	13	3	34	4	38	5	00	6	15	8	03	8	43	9	44	9	24
A	2	56	3	32	2	43	3	29	3	53	4	59	5	21	6	42	8	37	9	14	10	11⊙	9	53
M 19.	3	12	3	46	2	58	3	46	4	12	5	20	5	43	7	12	9	11	9	44	10	38	10	22
A	3	27	4	00	3	13	4	04	4	31	5	44	6	08	7	43⊙	9	44	10	14	11	06	10	53
M 20.	3	41	4	14	3	28	4	22	4	51	6	09	6	33	8	17	10	17	10	43	11	33	11	34
A	3	55	4	29	3	43	4	41	5	14⊙	6	34	7	02	8	51	10	48	11	11	11	59	11	24
M 21.	4	09⊙	4	45	3	58	5	02	5	38	7	03	7	30	9	26	11	19	11	39⊙				
A	4	23	5	02	4	14	5	26	6	05	7	32	8	02	10	00	11	48			0	26	0	25
M 22.	4	38	5	21	4	31	5	50⊙	6	22	8	03	8	34⊙	10	34			0	05	0	52	0	53
A	4	53	5	42	4	48	6	18	7	03	8	34	9	09	11	09	0	16	0	29	1	16	1	22
M 23.	5	09	6	06	5	09	6	48	7	34	9	07	9	43	11	41	0	42	0	52	1	39	1	48
A	5	28	6	31	5	31	7	20	8	07	9	40	10	18			1	05⊙	1	14	2	02	2	14⊙
M 24.	5	48	7	00	5	55	7	53	8	39	10	14⊙	10	54	0	12	1	28	1	36	2	23	2	38
A	6	09	7	32	6	23	8	28	9	13	10	47	11	28	0	39	1	48	1	56	2	44	2	59
M 25.	6	32	8	07⊙	6	54⊙	9	04	9	47	11	22			1	06	2	08	2	15	3	03⊙	3	19
A	6	58	8	43	7	26	9	41			11	54	0	01	1	30	2	26	2	34	3	21	3	38
M 26.	7	26	9	22	7	59	10	16	10	52			0	32	1	52	2	42	2	51	3	39	3	55
A	7	56	10	02	8	37	10	51	11	26	0	26	1	00	2	12⊙	2	58	3	08	3	57	4	14
M 27.	8	28	10	42	9	16	11	26	11	58⊙	0	57	1	26	2	30	3	13	3	24	4	17	4	33
A	9	03	11	22	9	55					1	24	1	50	2	47	3	27	3	40	4	36	4	53
M 28.	9	40⊙			10	34	0	00	0	29	1	50	2	13	3	03	3	42	3	57	4	57	5	13
A	10	18	0	00	11	11	0	31	0	59	2	14	2	33	3	17	3	57	4	14⊙	5	19	5	36
M 29.	10	58			11	47	1	00	1	26	2	35	2	51⊙	3	31	4	12	4	32	5	41	5	59
A	11	37					1	28⊙	1	51	2	55	3	08	3	44	4	28	4	51	6	06	6	24
M 30.					0	22	1	53	2	15	3	13	3	23	3	58	4	44	5	13	6	33	6	52⊙
A	0	15			0	54	2	16	2	38	3	29	3	38	4	13	5	03⊙	5	37	7	03	7	20
M 31.	0	51			1	22			2	58			3	51	4	27			6	03			7	46
A	1	23			1	48			3	17			4	05	4	43			6	30			8	20

M Stands for Morning. *A* Afternoon. ⊙ for Sunday.

An Account *of the foregoing* Tide-Table.
By the same Hand.

Sir,

COnfidering how much the River of *Thames* is fre-
quented by Shipping, and how long it has been
the Chief Place of *Commerce* in thefe Parts of the World,
one would think our *Seamens Accounts* of its *Tides*
fhould be very exact, and their Opinions concerning
them Rational ; whereas if they be enquired into, no-
thing will be found more Erroneous and Idle.

For they taking notice that the *High-waters* at and
near the *New* and *Full Moons,* run an hour and a half,
or two *Points* of the *Compafs* longer than at the *Quar-
ters,* conclude generally, that 'tis the Inconftancy of the
Winds that caufes it, never confidering how improbable
it is, that fo inconftant and changeable a *Caufe* fhould
effect fo conftant an *Inequality.*

In which Opinion the *Tide-Tables* of our *Almanacks*
have contributed much to confirm them ; for therein the
Moons Age is got by the *Epacts,* thence the Time of her
Southing by the allowance of 48 minutes of Time for
every Days Age, as if her *Diurnal Motions* and *Returns*
to the *Meridian* were altogether equable, than which
nothing is more falfe ; and then the Time of the *High-
Water* at *London-Bridge* is made by adding 3 hours to the
Time of her *Southing* fo got, as if there were the fame
conftant fpace of Time betwixt the *Moons Southing,* and
the *High-Waters,*which by this means are often made two
hours different from Truth and Experience.

To amend this fault, fome of the more skilful have
Calculated the Times of the *Moons Southings* exactly,and
then made their *Tide-Tables* by adding 3 hours conftantly
to them, by which means, tho they agreed nearer with
Experience at the *Spring-Tides,* or near the *New* and *Full
Moon,* yet they erred not much lefs (than by the old
way of account they would have done) at the *Quarters,*
or in the *Neap-Tides* ; the Inequality of the *Tides* being
above

above double to the Errour committed in finding the *Moons Southings* by her *Age*.

Mr. *Booker* was the firſt that gave any Directions for the amendment of this Reckoning, and that was only to ſubſtract an hour from the Times in his *Tide-Table*, about the firſt and laſt *Quarters* of the *Moon*, becauſe the *Neap-Tides* did not flow ſo long as the *Springs*, by one *Point* of the *Compaſs*. But Mr. *Henry Philips*, a Perſon well known by his Works of *Navigation*, was certainly, the firſt that brought the Inequality to a *Rule*, whoſe *Theory* of the *Tides*, and a *Table* grounded on it, for the *Year* 1668, was printed in Mr. *Oldenburgh's Philoſophical Tranſactions*, for the Month of *April* that Year, Numb. 34. which was found much more conformable to Experience than was expected.

Having frequent Occaſion to paſs betwixt *London* and *Greenwich* by Water, ſome two Years agone, I took notice that the *Tides* ſeldom held out ſo long as Mr. *Philips's* Calculation gave them, and therefore in the Months of *October* and *November*, I began to obſerve them more diligently, and procured them to be carefully noted by an ingenious Friend at *Tower-Wharfe*. From theſe Obſervations I raiſed a Correction of Mr. *Philips's Numbers*, and cauſed a *Tide-Table* to be made agreeable to it, which was Printed by Mr. *Hook* in his *Philoſophical Collections*, Numb. 4.

But the Weather then proving ſtormy and unſeaſonable, I durſt not rely on thoſe *Obſervations*, nor that *Correction*, and therefore in the *Spring* and *Summer Months* following of the *Year* 1682, I ſet to obſerve them again, and with the help of my Friends and Servants, I noted the Times of above 80 *High-Waters* at *Tower-Wharfe* and *Greenwich*, whereby I found that the greateſt and leaſt differences betwixt the *Moons true Southing*; and the *High-waters*, were not, as Mr. *Philips* had placed them, at the *Full* or *New* and *Quarter Moons*, but the greateſt nearer to the *Neaps*, the leaſt to the *Higheſt Spring-Tides*. I found alſo, that the Inequality was not the ſame that he had made it, and after a Trial or two, that I could repreſent and anſwer above 60 of theſe *Obſervations* wit'
leſs

less than one quarter of an hours difference; which, considering how difficult it is to determine the Time of an High-Water exactly, I cannot but esteem a very good Agreement.

Hitherto our *Tide-Tables* have only shewed the time of that *one High-water* which next follows the *Moons Southing*, but in this new *Table* I have given the times of both, concerning which, I desire it may be noted.

That when by reason of great *Droughts* in *Summer*, or extreme *Frosts* in *Winter*, the *Springs* are low, and the *Fresh Waters* less than usual, the *Tides* may hold up longer than the Times noted in the *Table*; as also when strong *North-Westerly* or *Northerly Winds* blow, which bring in an Extraordinary Floud from the *Northern Seas*, and keep it up longer than other times.

So on the contrary, when the Winds blow hard on the *Opposite Points* of the *Compass*, or when we have much *Rain* and great *Freshes*, the *Tides* hold not out so long as the Times shewed in the *Table*, the *Freshes* overpowring and checking them sooner; Yet have I never found that the differences betwixt the *Calculated* and *Observed High-Waters* have much exceeded half an hour; Most commonly they are scarce half so much.

This *Table* may be reduced and made to serve for any other *Port* of His Majesties Dominions or Neighbouring Countrys, by only subtracting or adding so much time to the *High-Waters* noted in it, as the *High-Water* observed in the said place shall be found to precede, or follow the Time of the *High-Water* the same Day herein noted. For by such Accounts as I have met with and received of the *Tides* in remote Places, I find there is every where, about *England*, the same difference betwixt the *Spring* and *Neap-Tides*, that is here observed in the River of *Thames*.

I could easily have made and given you a *Table* for this *Reduction*, if I durst have relied, on the Account our *Mariners* give of the *Tides* in other Ports, but I find their Opinions different, except where they have copied from one another in their *Kalendars*, by reason of the aforemention'd difference betwixt the Times of the *Moons southings,*

Southings, and the True *High-Waters*, for which reafon I forbear it, till further Experience fhall have informed us better.

An Obfervation of the Beginning of the Lunar Eclipfe *which hapned* Aug. 19. 1681. *in the Morning, made on the* Ifland *of* St. Lawrence *or* Madagafcar, *by Mr.* Tho. Heathcot, *and communicated by* Mr. Flamftead.

MR. *Heathcot* was Chyrurgeon to a Ship which lay then at the bottom of a deep *Bay* on the *Weftern Shore* of the *Ifland,* and that part which the *Portugefe* and our Maps call the *Terra del Gada,* he had with him then on Shore, a *Quadrant* of 2 Foot *Radius,* and a *Telefcope* of 9 Foot, but no Clock; to fupply which defect, he made a *Pendulum* of a String and a Bullet 39 Inches long, that each fingle *Vibration* might anfwer a *Second* of Time: Waiting the beginning of the *Eclipfe* with his Glafs, as foon as he faw the True *Shadow* enter on the *Moons Limb,* he caufed his Friends, who affifted him, to make the *Pendulum* Vibrate, and count its Vibrations; of which they had numbred 140 $\frac{2}{25}$ $\frac{m}{20}$ of time when he took the height of *Procyon* (then Eaft of the *Meridian*) $\frac{0}{25}$ $\frac{---}{30}$ the next day he obferved the Suns *Meridional* height with the fame *Quadrant,* whence he found the *Latitude* of that Place $\frac{0}{19}$ $\frac{1}{19}$ South, hence the time when he took the Height of *Procyon* is found $\frac{h}{4}$ $\frac{1}{51}$ *mane,* and fubftracting the $\frac{2}{2}$ $\frac{m}{20}$ paft fince the obferved beginning of the Eclips, its

	h	'	"
True Beginning was at	4	48	40
Which at the Obfervatory, here, I noted at	1	50	40
therefore this part of *Madagafcar* more *eaflerly*	2	58	00

or 44 $\overset{o}{30}$ $\overset{'}{}$, which our Maps make 52 *gr*; that is 7$\frac{1}{2}$ *gr* more remote from it than it really is.